AMENDMENT TO THE CLAIMS

Please amend the claims as set forth hereinbelow.

1. **(original)** A resonant optical modulator assembly, comprising:
   a. an alignment housing, the housing including a waveguide-alignment groove and a resonator alignment groove;
   b. a transmission optical waveguide, the waveguide being positioned within the waveguide alignment groove and secured to the alignment housing, the transmission optical waveguide being arranged for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide also having an evanescent optical coupling segment;
   c. a resonator, the resonator positioned within the resonator alignment groove and secured to the alignment device, the resonator being arranged for supporting a resonator optical mode, the resonator being positioned so that the resonator evanescently optically couples with the transmission optical waveguide coupling segment;
   d. an optical modulator, the optical modulator positioned on and secured to the alignment housing, the optical modulator being evanescently optically coupled with the resonator;
   e. a modulator controller, the modulator controller being operatively coupled to the optical modulator for modulating, in response to an applied control signal, at least one of:
      i) a level of optical power transfer through the evanescent optical coupling between the resonator and the optical modulator;
      ii) a level of optical loss of the optical modulator; and
      iii) a resonant frequency of the optical modulator
      thereby enabling controlled modulation of a coupling condition between the transmission optical waveguide and the resonator; and,
   f. the waveguide-alignment groove and the resonator-alignment groove being arranged so as to reproducibly establish and stably maintain evanescent optical coupling between the transmission optical waveguide and the resonator and wherein the alignment housing reproducibly establishes and

stably maintains evanescent optical coupling between the resonator and the optical modulator.

2. **(original)** The resonant optical modulator assembly of Claim 1 wherein the resonator includes a plurality of fiber-ring resonator segments, at least two of which resonator segments are evanescently optically coupled together.

3. **(previously presented)** The resonant optical modulator assembly of Claim 1 wherein the waveguide alignment groove has an enlarged central portion, thereby enabling heating and pulling of an optical fiber positioned within the waveguide-alignment groove to form a fiber optic taper segment while substantially reducing contact between the alignment housing and the fiber-optic-taper segment, the optical fiber thereby forming the transmission optical waveguide.

4. **(previously presented)** The resonant optical modulator assembly of Claim 1 wherein the transmission optical waveguide comprises a transmission fiber optic waveguide, the evanescent optical coupling segment of the transmission fiber optic waveguide comprises a fiber-optic-taper segment, and the fiber-optic-taper segment is partially wrapped around a portion of an outer circumference of the resonator.

5. **(previously presented)** The resonant optical modulator assembly of Claim 4 further including a wrapping adjuster, the wrapping adjuster being arranged so as to modify the spatial extent of the wrapped portion of the outer circumference of the resonator by the transmission fiber optic waveguide evanescent optical coupling segment, thereby enabling adjustment of the level of evanescent optical coupling between the transmission fiber optic waveguide and the resonator.

6. **(previously presented)** The resonant optical modulator assembly of Claim 5, wherein the alignment housing is further arranged for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment in a partially wrapped engagement around the resonator, the taper segment support members being positioned on the alignment housing with the resonator alignment groove therebetween.

7. **(original)** A method for assembling a resonant optical modulator comprising the steps of:
   a. positioning a fiber optic waveguide within a waveguide alignment groove in an alignment housing and securing the waveguide to the alignment groove;
   b. positioning a resonator within a resonator alignment groove in on alignment housing and securing the resonator to the alignment groove;
   c. positioning and securing an optical modulator on the alignment housing, the optical modulator being operatively coupled to the resonator; and
   d. operatively coupling a modulator controller to the optical modulator.

8. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:
   a. an alignment housing including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;
   b. a first transmission optical waveguide, the first waveguide being assembled with the alignment housing within the first waveguide-alignment groove and secured to the alignment housing, and arranged for transmitting therethrough a plurality of optical signals, each carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide having an evanescent optical coupling segment with an evanescent portion of each waveguide optical mode extending transversely beyond a surface of the evanescent optical coupling segment;
   c. a second transmission optical waveguide, the second waveguide being assembled with the alignment housing within the second waveguide-alignment groove and secured to the alignment housing, and arranged for transmitting therethrough a plurality of optical signals, each carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide having an evanescent optical coupling segment with an evanescent portion of the waveguide optical mode extending transversely beyond a surface of the evanescent optical coupling segment; and,

d. a resonator, the resonator being assembled with the alignment housing within the resonator-alignment groove and secured to the alignment housing, and arranged for supporting a resonant optical mode, the resonator being positioned so as to be evanescently optically coupled to the first transmission optical waveguide coupling segment and the second transmission optical waveguide coupling segment.

9. **(original)** The resonant optical filter assembly of Claim 8, wherein the resonant optical filter assembly is an optical WDM slicer/interleaver.

10. **(original)** The resonant optical filter assembly of Claim 8, wherein the resonant optical filter is an optical channel add/drop filter.

11. **(original)** The resonant optical filter assembly of Claim 8, wherein the first and second waveguides are fiber optic waveguides and the evanescent optical coupling segments includes fiber-optic-taper segments, and wherein at least one of the first and second waveguide-alignment grooves has an enlarged central portion, thereby enabling heating and pulling of an optical fiber positioned within the centrally-enlarged waveguide-alignment groove to form the fiber-optic-taper segment of the respective waveguide while substantially reducing contact between the alignment housing and the respective fiber-optic-taper segment.

12. **(previously presented)** A method for assembling a resonant optical filter assembly comprising the steps of:

a. assembling a first waveguide with an alignment housing within a first waveguide-alignment groove thereon and securing the first waveguide to the alignment housing;

b. assembling a second waveguide with the alignment housing within a second waveguide-alignment groove thereon and securing the second waveguide to the alignment housing; and

c. assembling the resonator with the alignment housing within a resonator-alignment groove thereon and securing the resonator to the alignment housing.

13. **(previously present d)** In a resonant optical modulator assembly, the assembly comprising

an alignment member,

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

an optical resonator for supporting at least one resonant optical mode, the optical resonator being assembled with and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide at the evanescent optical coupling segment thereof, and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being assembled with the alignment member so as to be evanescently optically coupled to the optical resonator,

the improvement comprising:

a waveguide-alignment groove provided in the alignment member for receiving the transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the optical resonator therein,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the evanescent optical coupling segment of the transmission optical waveguide.

14. **(previously presented)** In a resonant optical modulator assembly, the assembly comprising

an alignment member,

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

an optical resonator for supporting at least one resonant optical mode, the optical resonator being assembled with and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide at the evanescent optical coupling segment thereof, and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned on and secured to the alignment member so as to be evanescently optically coupled to the optical resonator,

the improvement comprising:

a waveguide-alignment groove provided in the alignment member for receiving the transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the optical resonator therein,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the evanescent optical coupling segment of the transmission optical waveguide,

the resonator-alignment groove and the modulator being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the optical modulator.

15. **(previously presented)** In a resonant optical modulator assembly, the assembly comprising

an alignment member,

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

multiple optical resonators, each of the multiple optical resonators supporting at least one corresponding resonant optical mode, the multiple optical resonators being assembled with and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide at the evanescent optical coupling segment thereof; and

multiple optical modulators, each positioned so as to be evanescently optically coupled to a corresponding optical resonator, for modulating, in response to an applied control signal, corresponding coupling conditions between the transmission optical waveguide and the corresponding optical resonators, in turn enabling controlled modulation of a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode carrying the optical signal is substantially resonant with at least one of the corresponding resonant optical modes,

the improvement comprising:

a waveguide-alignment groove provided in the alignment member for receiving the transmission optical waveguide therein; and

multiple resonator-alignment grooves, each provided in the alignment member for receiving a corresponding optical resonator therein,

the waveguide-alignment groove and the multiple resonator-alignment grooves being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the multiple optical resonators and the evanescent optical coupling segment of the transmission optical waveguide.

16. **(previously pr sented)** In a resonant optical modulator assembly, the assembly comprising

an alignment member,

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

an optical resonator for supporting at least one resonant optical mode, the optical resonator being assembled with and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the evanescent optical coupling segment thereof, and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the optical resonator,

the improvement comprising:

a waveguide-alignment groove provided in the alignment member for receiving the transmission fiber-optic waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the optical resonator therein,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the evanescent optical coupling segment of the transmission fiber-optic waveguide.

17. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a polarization-preserving transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

an optical resonator for supporting at least one resonant optical mode, the optical resonator being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the evanescent optical coupling segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the evanescent optical coupling segment of the transmission fiber-optic waveguide.

18. **(previously presented)** In a resonant optical modulator assembly, the assembly comprising

an alignment member,

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being assembled with and secured to the alignment member and having a fiber-optic-taper segment,

an optical resonator for supporting at least one resonant optical mode, the optical resonator being assembled with and secured to the alignment member so as

to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof, and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the optical resonator,

the improvement comprising:

a waveguide-alignment groove provided in the alignment member for receiving the transmission fiber-optic waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the optical resonator therein,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the fiber-optic-taper segment of the transmission optical waveguide.

19. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a side-etched evanescent optical coupling segment;

an optical resonator for supporting at least one resonant optical mode, the optical resonator being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the

transmission fiber-optic waveguide at the side-etched evanescent optical coupling segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the side-etched evanescent optical coupling segment of the transmission fiber-optic waveguide.

20. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the

resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and the evanescent optical coupling segment of the transmission optical waveguide.

21. **(previously presented)**A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator fiber being provided with a delocalized-

optical-mode suppressor on at least one of the first and second segments of the resonator optical fiber, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and the evanescent optical coupling segment of the transmission optical waveguide.

22. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support

at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator fiber being provided with a hermetic carbon delocalized-optical-mode suppressor on at least one of the first and second segments of the resonator optical fiber, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and the evanescent optical coupling segment of the transmission optical waveguide.

23. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an

immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being provided with a taper-positioning-and-support member, the taper-positioning-and-support member being adapted for engaging the fiber-optic-taper segment in proximity to the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to evanescently optically couple the fiber-ring optical resonator and the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof and so as to engage the fiber-optic-taper segment and the taper-positioning-and-support member; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member and the taper-positioning-and-support member being positioned on the resonator optical fiber so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and the fiber-optic-taper segment of the transmission fiber-optic waveguide.

24. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic

waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being provided with a taper-positioning-and-support member, the taper-positioning-and-support member being adapted for engaging the fiber-optic-taper segment in proximity to the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to evanescently optically couple the fiber-ring optical resonator and the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof and so as to engage the fiber-optic-taper segment and the taper-positioning-and-support member; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member and the taper-positioning-and-support member being positioned on the resonator optical fiber so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and the fiber-optic-taper segment of the transmission fiber-optic waveguide,

the taper-positioning-and-support member being positioned on the resonator optical fiber so as to position the fiber-optic-taper segment at a location axially displaced from an axial midpoint of the fiber-ring optical resonator; thereby substantially reducing undesirable taper-induced optical loss of the fiber-ring optical resonator.

25. **(previously presented)**A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission fiber-optic waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof.

26. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof,

a desired length of an elongated region of evanescent optical coupling provided by partially wrapping the fiber-optic-taper segment around the fiber-ring optical resonator being determined by a desired level of evanescent optical coupling between the fiber-ring resonator and the fiber-optic-taper segment,

arrangement of the waveguide-alignment groove and the resonator-alignment groove on the alignment member being determined by the desired length of the elongated region of evanescent optical coupling.

27. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove, a resonator-alignment groove, and a pair of taper-segment-support members, the taper-segment-support members being positioned on the alignment member with the resonator groove therebetween;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be

evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove, the resonator-alignment groove, and the taper-segment-support members being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof and engaged with the taper-segment-support members.

28. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove, a resonator-alignment groove, and a pair of taper-segment-support grooves, the taper-segment-support grooves being positioned on the alignment member with the resonator groove therebetween;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the

resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

a pair of taper-segment-support fibers, the taper-segment-support fibers being respectively positioned within the pair of taper-segment-support grooves and secured to the alignment member, each taper-segment-support fiber including a taper-support segment integral with the taper-segment-support fiber between adjacent segments of the taper-segment-support fiber, the taper-segment-support fibers being positioned so as to support the fiber-optic-taper segment on the respective fiber-taper-support segments; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove, the resonator-alignment groove, and the taper-segment-support grooves being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof and engaged with the taper-segment-support segments.

29. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove, a resonator-alignment groove, and a pair of taper-segment-support grooves, the taper-segment-support grooves being positioned on the alignment member with the resonator groove therebetween;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical

waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

a pair of taper-segment-support fibers, the taper-segment-support fibers being respectively positioned within the pair of taper-segment-support grooves and secured to the alignment member, each taper-segment-support fiber including a taper-support segment integral with the taper-segment-support fiber between adjacent segments of the taper-segment-support fiber, the taper-segment-support fibers being positioned so as to support the fiber-optic-taper segment on the respective fiber-taper-support segments; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove, the resonator-alignment groove, and the taper-segment-support grooves being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical

resonator near a portion of the outer circumference thereof and engaged with the taper-segment-support segments,

the taper-segment-support segment including paired axially-juxtaposed radially-extending radially-tapered transverse flanges, the fiber-optic-taper segment resting on the paired flanges..

30. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove, a resonator-alignment groove, and a pair of taper-segment-support grooves, the taper-segment-support grooves being positioned on the alignment member with the resonator groove therebetween;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

a pair of taper-segment-support fibers, the taper-segment-support fibers being respectively positioned within the pair of taper-segment-support grooves and secured to the alignment member, each taper-segment-support fiber including a taper-support segment integral with the taper-segment-support fiber between adjacent segments of the taper-segment-support fiber, the taper-

segment-support fibers being positioned so as to support the fiber-optic-taper segment on the respective fiber-taper-support segments, each taper-segment-support fiber being provided with a de-localized-optical-mode suppressor on at least one of the adjacent segments thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove, the resonator-alignment groove, and the taper-segment-support grooves being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof and engaged with the taper-segment-support segments.

31. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove, a resonator-alignment groove, and a pair of taper-segment-support grooves, the taper-segment-support grooves being positioned on the alignment member with the resonator groove therebetween;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments

of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission fiber-optic waveguide at the fiber-optic-taper segment thereof; and

a pair of taper-segment-support fibers, the taper-segment-support fibers being respectively positioned within the pair of taper-segment-support grooves and secured to the alignment member, each taper-segment-support fiber including a taper-support segment integral with the taper-segment-support fiber between adjacent segments of the taper-segment-support fiber, the taper-segment-support fibers being positioned so as to support the fiber-optic-taper segment on the respective fiber-taper-support segments, each taper-segment-support fiber being provided with a hermetic carbon coating de-localized-optical-mode suppressor on at least one of the adjacent segments thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission fiber-optic waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove, the resonator-alignment groove, and the taper-segment-support grooves being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the fiber-ring optical resonator near a portion of the outer circumference thereof and engaged with the taper-segment-support segments.

32. **(previously presented)**A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and multiple resonator-alignment grooves;

a transmission fiber-optic waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having a fiber-optic taper segment;

multiple fiber-ring optical resonators, each formed on a corresponding resonator optical fiber, each fiber-ring optical resonator including a transverse resonator segment integral with the corresponding resonator optical fiber between first and second segments of the corresponding resonator optical fiber, each resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the corresponding resonator optical fiber so as to enable the resonator segment to support at least one corresponding resonant optical mode near an outer circumferential surface of the resonator segment, each resonator optical fiber being positioned within a corresponding one of the multiple resonator-alignment grooves and secured to the alignment member so as to be evanescently optically coupled to the fiber-optic taper segment of the transmission fiber-optic waveguide; and

multiple optical modulators for modulating, in response to a corresponding applied control signal, a coupling condition between the transmission fiber-optic waveguide and a corresponding one of the multiple fiber-ring optical resonators so as to controllably modulate a level of transmission through the transmission fiber-optic waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the corresponding resonant optical modes, each optical modulator being positioned so as to be evanescently optically coupled to the corresponding fiber-ring optical resonator,

the waveguide-alignment groove and the multiple resonator-alignment grooves being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the multiple fiber-ring optical resonators near portions of the outer circumferences thereof.

33. **(previously present d)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the fiber-ring optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being provided on the resonator fiber and positioned so as to be evanescently optically coupled to the fiber-ring optical resonator,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the fiber-ring optical resonator and evanescent optical coupling segment of the transmission optical waveguide.

34. **(previously presented)** A resonant optical modulator assembly, comprising:

an alignment member, the alignment member including a waveguide-alignment groove and a resonator-alignment groove;

a transmission optical waveguide adapted for transmitting therethrough an optical signal carried by a waveguide optical mode, the transmission optical waveguide being positioned within the waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

an optical resonator for supporting at least one resonant optical mode, the optical resonator being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the transmission optical waveguide at the evanescent optical coupling segment thereof; and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between the transmission optical waveguide and the optical resonator so as to controllably modulate a level of transmission through the transmission optical waveguide of the optical signal when the waveguide optical mode is substantially resonant with at least one of the resonant optical modes, the optical modulator being positioned so as to be evanescently optically coupled to the optical resonator,

the alignment member comprising

a first alignment substrate including the waveguide-alignment groove thereon, and

a second alignment substrate positioned on and secured to the first alignment substrate, the second alignment substrate including at least one of the resonator-alignment groove thereon and the optical modulator positioned thereon and secured thereto,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the transmission optical waveguide and the optical resonator,

the resonator-alignment groove and the modulator being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the optical modulator.

35. **(previously presented)** A method for assembling a resonant optical modulator assembly, comprising the steps of:

positioning a transmission optical waveguide within a waveguide-alignment groove of an alignment member and securing the transmission optical waveguide to the alignment member;

positioning an optical resonator within a resonator-alignment groove of the alignment member, so that the optical resonator is evanescently optically coupled to an evanescent optical coupling segment of the transmission optical waveguide, and securing the optical resonator to the alignment member; and

positioning an optical modulator on the alignment member, so that the optical modulator is evanescently optically coupled to the optical resonator, and securing the optical modulator to the alignment member,

the waveguide-alignment groove and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the optical resonator and the evanescent optical coupling segment of the transmission optical waveguide.

36. **(previously presented)** In a resonant optical filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment

member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

37. **(previously presented)** In a resonant optical filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof, and

an optical modulator for modulating, in response to an applied control signal, a coupling condition between at least one of the first and second transmission optical waveguides and the resonant optical assembly, the optical modulator being positioned so as to be evanescently optically coupled to the resonant optical assembly,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the optical modulator being adapted for enabling transfer of a resonant optical signal to be disabled in response to an applied disabling control signal and re-enabled in response to an applied enabling control signal,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

38. **(previously presented)** In a resonant optical filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a single optical resonator for supporting at least one resonant optical mode, the optical resonator being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the optical resonator therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the optical resonator and between the second transmission optical waveguide and the optical resonator.

39. **(previously presented)** In a resonant-optical-filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a coupled-resonator optical assembly, the coupled-resonator optical assembly supporting resonant optical modes and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the coupled-resonator optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the coupled-resonator optical assembly and between the second transmission optical waveguide and the coupled-resonator optical assembly.

40. **(previously presented)** In an optical slicer/interleaver assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the

WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

multiple optical signals entering the optical slicer/interleaver assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the optical slicer/interleaver assembly therethrough,

multiple optical signals entering the optical slicer/interleaver assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the optical slicer/interleaver assembly therethrough,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

41. **(previously presented)** In an optical channel add/drop filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the optical channel add/drop filter assembly through one of the first and second transmission optical waveguides and substantially

resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the optical channel add/drop filter assembly therethrough,

multiple optical signals entering the optical channel add/drop filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the optical channel add/drop filter assembly therethrough,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

42. **(previously presented)** In a resonant optical filter assembly for an optical WDM system, the assembly comprising

an alignment member;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with

and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

43. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with the alignment member within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with the alignment member within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with the alignment member within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically

coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a polarization-preserving fiber-optic waveguide.

44. **(previously presented)** In a resonant optical filter assembly for an optical WDM system, the assembly comprising

an alignment member,

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with

and secured to the alignment member and having an evanescent optical coupling segment,

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with and secured to the alignment member and having an evanescent optical coupling segment, and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide,

the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the improvement comprising:

a first waveguide-alignment groove provided in the alignment member for receiving the first transmission optical waveguide therein;

a second waveguide-alignment groove provided in the alignment member for receiving the second transmission optical waveguide therein; and

a resonator-alignment groove provided in the alignment member for receiving the resonant optical assembly therein,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

45. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with the alignment member within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with the alignment member within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being

assembled with the alignment member within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a fiber-optic waveguide,

the evanescent optical coupling segment of the transmission fiber-optic waveguide being a side-etched fiber-optic segment.

46. **(previously presented)**A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with the alignment member within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with the alignment member within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with the alignment member within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

47. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by

a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator fiber being provided with a delocalized-optical-mode suppressor on at least one of the first and second segments of the resonator optical fiber, the

resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

48. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission

optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator fiber being provided with a hermetic carbon coating delocalized-optical-mode suppressor on at least one of the first and second segments of the resonator optical fiber, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical

waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

49. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being provided with a taper-positioning-and-support member for engaging the fiber-optic-taper segment in proximity to the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

50. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second

transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being provided with a taper-positioning-and-support member for engaging the fiber-optic-taper segment in proximity to the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly,

the taper-positioning-and-support member being positioned on the resonator optical fiber so as to position the fiber-optic-taper segment at a location axially displaced from an axial midpoint of the at least one fiber-ring optical resonator, thereby substantially reducing undesirable taper-induced optical loss of the at least one fiber-ring optical resonator.

51. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second

transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof.

52. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the

WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at

least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

a desired length of an elongated region of evanescent optical coupling provided by partially wrapping the fiber-optic-taper segment around the fiber-ring optical resonator being determined by a desired level of evanescent optical coupling between the fiber-ring optical resonator and the fiber-optic-taper segment,

arrangement of the waveguide-alignment groove and the resonator-alignment groove on the alignment member being determined by the desired length of the elongated region of evanescent optical coupling.

53. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within

the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as

to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

the alignment member further including a pair of taper-segment-support members for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment partially wrapped around the at least one fiber-ring optical resonator, the taper-segment-support members being positioned on the alignment member with the resonator-alignment groove therebetween.

54. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode, corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator

optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

the alignment member further including a pair of taper-segment-support fibers for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment partially wrapped around the at least one fiber-ring optical resonator, the taper-segment-support fibers being positioned on the alignment member in corresponding taper-segment-support-fiber grooves thereof with the resonator-alignment groove therebetween,

each taper-segment-support fiber comprising a transverse taper-segment-support segment integral with the taper-segment-support fiber between adjacent support-fiber segments, the fiber-optic-taper segment being supported by an outer circumference of the taper-segment-support segment.

55. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within

the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as

to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

the alignment member further including a pair of taper-segment-support fibers for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment partially wrapped around the at least one fiber-ring optical resonator, the taper-segment-support fibers being positioned on the alignment member in corresponding taper-segment-support-fiber grooves thereof with the resonator-alignment groove therebetween,

each taper-segment-support fiber comprising a transverse taper-segment-support segment integral with the taper-segment-support fiber between adjacent support-fiber segments, the fiber-optic-taper segment being supported by an outer circumference of the taper-segment-support segment,

the taper-segment-support segment including paired axially-juxtaposed radially-extending radially-tapered transverse flanges, the fiber-optic-taper segment resting on the paired flanges.

56. **(previously presented)**A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

the alignment member further including a pair of taper-segment-support fibers for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment partially wrapped around the at least one fiber-ring optical resonator, the taper-segment-support fibers being positioned on the alignment member in corresponding taper-segment-support-fiber grooves thereof with the resonator-alignment groove therebetween,

each taper-segment-support fiber comprising a transverse taper-segment-support segment integral with the taper-segment-support fiber between adjacent support-fiber segments, the fiber-optic-taper segment being supported by an outer circumference of the taper-segment-support segment,

each taper-segment-support fiber being provided with a de-localized-optical-mode suppressor on at least one of the adjacent segment thereof for suppressing optical modes of the taper-segment-support fiber.

57. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being positioned within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being positioned within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the resonant optical assembly including at least one fiber-ring optical resonator formed on a resonator optical fiber, the fiber-ring optical resonator including a transverse resonator segment integral with the resonator optical fiber between first and second segments of the resonator optical fiber, the resonator segment having a circumferential optical path length sufficiently different from a circumferential optical path length of an immediately adjacent portion of at least one of the first and second segments of the resonator optical fiber so as to enable the resonator segment to support at least one resonant optical mode near an outer circumferential surface of the resonator segment, the resonator optical fiber being positioned within the resonator-alignment groove and secured to the alignment member so as to be evanescently optically coupled to the first and second transmission optical waveguides,

at least one of the first transmission optical waveguide and the second transmission optical waveguide being a transmission fiber-optic waveguide, the evanescent optical coupling segment of the transmission fiber-optic waveguide being a fiber-optic-taper segment,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so that the fiber-optic-taper segment is partially wrapped around the at least one fiber-ring optical resonator near a portion of the outer circumference thereof,

the alignment member further including a pair of taper-segment-support fibers for engaging the fiber-optic-taper segment and holding the fiber-optic-taper segment partially wrapped around the at least one fiber-ring optical resonator, the taper-segment-support fibers being positioned on the alignment member in

corresponding taper-segment-support-fiber grooves thereof with the resonator-alignment groove therebetween,

each taper-segment-support fiber comprising a transverse taper-segment-support segment integral with the taper-segment-support fiber between adjacent support-fiber segments, the fiber-optic-taper segment being supported by an outer circumference of the taper-segment-support segment,

each taper-segment-support fiber being provided with a hermetic carbon coating de-localized-optical-mode suppressor on at least one of the adjacent segment thereof for suppressing optical modes of the taper-segment-support fiber.

58. **(previously presented)** A resonant optical filter assembly for an optical WDM system, comprising:

an alignment member, the alignment member including a first waveguide-alignment groove, a second waveguide-alignment groove, and a resonator-alignment groove;

a first transmission optical waveguide adapted for transmitting therethrough at least one of a plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the first transmission optical waveguide being assembled with the alignment member within the first waveguide-alignment groove and secured to the alignment member and having an evanescent optical coupling segment;

a second transmission optical waveguide adapted for transmitting therethrough at least one of the plurality of optical signals, each optical signal being carried by a respective waveguide optical mode corresponding to an optical channel of the WDM system, the second transmission optical waveguide being assembled with the alignment member within the second waveguide-alignment grooves and secured to the alignment member and having an evanescent optical coupling segment; and

a resonant optical assembly including at least one optical resonator, the resonant optical assembly supporting at least one resonant optical mode and being assembled with the alignment member within the resonator-alignment groove

and secured to the alignment member so as to be evanescently optically coupled to the first transmission optical waveguide and the second transmission optical waveguide at the respective evanescent optical coupling segments thereof,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially resonant with at least one of the resonant optical modes being substantially transferred from the one to the other of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

an optical signal entering the resonant optical filter assembly through one of the first and second transmission optical waveguides and substantially non-resonant with any resonant optical mode supported by the resonant optical assembly substantially remaining within the one of the first and second transmission optical waveguides and leaving the resonant optical filter assembly therethrough,

the alignment member comprising

a first alignment substrate including the first waveguide-alignment groove thereon, and

a second alignment substrate positioned on and secured to the first alignment substrate, the second alignment substrate including at least one of the resonator-alignment groove and the second waveguide-alignment groove thereon,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

59. **(previously presented)** A method for assembling a resonant optical filter assembly, comprising the steps of:

assembling a first transmission optical waveguide with an alignment member within a first waveguide-alignment groove thereof and securing the first transmission optical waveguide to the alignment member;

assembling a second transmission optical waveguide with the alignment member within a second waveguide-alignment groove thereof and securing the second transmission optical waveguide to the alignment member; and

assembling a resonant optical assembly with the alignment member within a resonator-alignment groove thereof, so that the resonant optical assembly is evanescently optically coupled to an evanescent optical coupling segment of the first transmission optical waveguide and evanescently optically coupled to an evanescent optical coupling segment of the second transmission optical waveguide, and securing the optical resonator to the alignment member,

the first waveguide-alignment groove, the second waveguide-alignment groove, and the resonator-alignment groove being positioned on the alignment member so as to substantially reproducibly establish and substantially stably maintain evanescent optical coupling between the first transmission optical waveguide and the resonant optical assembly and between the second transmission optical waveguide and the resonant optical assembly.

60. **(previously presented)** The resonant optical modulator assembly of Claim 1, wherein the resonator includes at least one fiber-ring resonator.

61. **(previously presented)** The resonant optical filter assembly of Claim 8, wherein:

the first transmission optical waveguide comprises a first transmission fiber optic waveguide, the evanescent optical coupling segment of the first transmission fiber optic waveguide comprises a first fiber-optic-taper segment, and the first fiber-optic-taper segment is partially wrapped around a portion of an outer circumference of the resonator, and

the second transmission optical waveguide comprises a second transmission fiber optic waveguide, the evanescent optical coupling segment of the second transmission fiber optic waveguide comprises a second fiber-optic-taper segment, and the second fiber-optic-taper segment is partially wrapped around a portion of an outer circumference of the resonator.

62. **(previously presented)** The resonant optical filter assembly of Claim 61, further comprising a wrapping adjuster, the wrapping adjuster being arranged so as to modify the spatial extent of the wrapped portion of the outer circumference of the resonator by at least one of the transmission fiber optic waveguide evanescent optical coupling segments, thereby enabling adjustment of the level of evanescent optical coupling between the wrapped transmission fiber optic waveguide and the resonator.

63. **(currently amended)** The resonant optical modulator assembly of Claim 62, wherein the alignment housing is further arranged for engaging the wrapped fiber-optic-taper segment and holding the wrapped fiber-optic-taper segment in a partially wrapped engagement around the resonator, the wrapping adjuster comprising a pair of taper segment support members ~~being~~ positioned on the alignment housing with the resonator alignment groove therebetween.